

B. REMARKS

Claims 25 and 26 stand rejected under 35 U.S.C. 102(e) as being anticipated by Schwartz, et. al. This rejection is respectfully traversed.

The present invention is directed to a zeolite having an AAI of at least 1.2. The zeolite has been prepared by a process including removal of a tetraethylammonium templating agent. The process comprises removing the templating agent at a temperature of no greater than 550°C and under conditions wherein after removal of the templating agent, the zeolite has an AAI of at least 1.2. The zeolite is selected from the group consisting of zeolite Beta, TEA-mordenite, and TEA-ZSM-12.

Schwartz discloses the preparation of a uniformly impregnated extrudate catalyst. The catalyst may include a zeolite. The extrudate is dried at less than about 500°F, and then impregnated with a noble metal by contacting the extrudate with an impregnating solution which includes an aqueous solvent, a water-soluble compound containing the metal, and an amount of ammonium ions which is from about 0.01% to about 60% of the ion exchange capacity of the zeolite. The solvent then is vaporized.

The extrudate then is calcined to produce a uniformly impregnated extrudate catalyst. The extrudate is maintained at less than about 500°F during the period from the start of extruding to immediately before impregnating.

Furthermore, in Schwartz, a starting material including sources of alumina and silica is mixed with a caustic mineralizing agent under temperature and pressure conditions which provide for crystallization. After washing and filtration, the crystals were ion exchanged with ammonium ion, such as by contacting the crystals with ammonium nitrate, to obtain the

ammonium form of the zeolite. Decomposition of the ammonium form of the zeolite at elevated temperature will produce the zeolite in acidic form which includes strong and weak acidic sites.

The Examiner bases the rejection upon the graph shown in Figure 1, and passages from column 3, line 7 through column 4, line 37; at column 5, lines 29-32; from column 8, line 20 through column 9, line 20; and from column 12, line 31 through column 13, line 9. A review of Figure 1 and of the cited passages indicates clearly that Figure 1 and the cited passages refer to Zeolite Y, and not Zeolite Beta, TEA-mordenite, or TEA-ZSM-12 as claimed by Applicants.

In addition, the data shown in Figure 1 and described in Example 6 in Schwartz refer to temperature programmed decomposition measurements of described ammonia as the zeolite Y is being heated at varying temperatures to provide the final catalyst product. More particularly, as indicated at column 12, lines 33-47 of Schwartz, zeolite Y extrudates are dried at 250°F. The extrudates then were divided into three lots, 6A, 6B, and 6C. Lot 6A receives no further treatment prior to the temperature programmed desorption. Lot 6B is dried again at 350°F. Lot 6C is dried again at 500°F. The lots are heated in a controlled manner, and the rate of ammonia desorption is measured. The rates of ammonia desorption are expressed in milliliters of ammonia per gram of extrudate per degree Centigrade of programmed temperature increase, and are plotted on Figure 1.

In Example 6 of Schwartz, the ammonia desorption which is being measured is that which occurs during the catalyst manufacturing process. It is not a measure of the acidity activity index, or AAI of the catalyst.

In contrast, in Example 3 of the above-identified application, a zeolite Beta sample which has been made in accordance with the present invention, i.e., Sample 2 from Example 1, as well as Sample 1 from Example 1 and four commercially available zeolite Beta samples, all of which are outside the scope of the present invention, were treated with ammonia, and then subjected to

temperature programmed desorption in order to determine the acidity activity index, or AAI, of the zeolite Beta samples.

Schwartz merely measures the desorption of ammonia from a zeolite Y catalyst as the catalyst is being manufactured. Furthermore, Schwartz's pretreatment conditions and procedures for measuring temperature programmed desorption are different from Applicants' procedures and conditions, shown in Example 3 of the specification. Such measurements as determined by Schwartz do not provide one skilled in the art with the AAI of a manufactured catalyst. In contrast, Applicants measure the temperature programmed desorption of a catalyst in which the manufacturing process already has been completed, in order to determine the AAI of the catalyst. Therefore, Schwartz provides no basis for one of ordinary skill in the art to produce Applicants' claimed catalyst, which has an AAI of at least 1.2.

Also, Applicants, in contrast to Schwartz, prepare their claimed zeolite by a process including removal of a tetraethylammonium templating agent. Schwartz does not disclose or even remotely suggest to one of ordinary skill in the art the use of a tetraethylammonium templating agent in his process for synthesizing a zeolite. Therefore, Schwartz does not anticipate Applicants' zeolite as claimed, nor does Schwartz render Applicants' zeolite as claimed obvious to one of ordinary skill in the art. It is therefore respectfully requested that the rejection under 35 U.S.C. 102(e) be reconsidered and withdrawn.

Claims 4, 7, 25, 27, and 28 stand rejected under 35 U.S.C. 103 as being unpatentable over Kocal. This rejection is respectfully traversed.

Kocal as stated previously, discloses a process for producing aromatic compounds from C₂-C₆ aliphatic hydrocarbons. The C₂-C₆ aliphatic hydrocarbon feedstock is passed into a reaction zone and into contact with two discrete catalysts. The first catalyst is comprised in part of a ZSM-5 zeolite catalyst. The second catalyst is comprised in part of a catalyst which is not a

ZSM-5 catalyst, and has an acidity which is lower than that of the first catalyst. The second catalyst may be silicalite. The first catalyst may include one or more of ZSM-5, ZSM-8, ZSM-11, ZSM-12, or ZSM-35.

In addition, Kocal, in Example 1, describes temperature programmed desorption (TPD) experiments for ZSM-5, silicalite, and H-mordenite. Figure 1 of Kocal shows the number of acid sites as a function of desorption temperature for three different zeolites, i.e., H-mordenite, ZSM-5, and silicalite. In order to obtain the sum of weak acid sites ($<300^{\circ}\text{C}$) and the sum of strong acid sites ($>300^{\circ}\text{C}$), one needs to integrate the areas under the peaks of the TPD curve. It is not taken at a single temperature point as the Examiner indicated.

Contrary to the assertions of the Examiner, the graph of Figure 1 shows clearly that for all three zeolites, the total ammonia desorbed above 300°C , as shown by the area under the curve, is lower considerably than the total ammonia desorbed below 300°C .

This can be seen by comparing the integrated area under each of the three curves below 300°C to the integrated area above 300°C ; for all three zeolites the area below 300°C is bigger. (The ratio of the area under the curve below 300°C to the area under the curve above 300°C is the AAI.)

Thus, the AAI for these three zeolites is less than 1, and not greater than 1.2 as asserted by the Examiner. Furthermore, Kocal's temperature programmed desorption procedure, as given in Example 1, are different from Applicants' procedure given in Example 3.

Kocal, therefore, does not disclose or even remotely suggest to one of ordinary skill in the art a catalyst which may be zeolite beta, TEA-mordenite, or TEA-ZSM-12, which has an AAI of at least 1.2 and which has been prepared by a process including removal of a tetraethylammonium templating agent, wherein the templating agent is removed at a temperature of no greater than 550°C . Furthermore, with respect to Claims 4 and 7, although Kocal discloses

a zeolite having a silica to alumina ratio of at least 12:1, the zeolite referred to in Kocal is either ZSM-5 or silicalite. Kocal does not disclose or even remotely suggest to one of ordinary skill in the art a zeolite-Beta, TEA-mordenite, or TEA-ZSM-12 catalyst having a silica to alumina ratio of at least 6:1, as defined in Claim 4, or a silica to alumina ratio of at least 15:1, as defined in Claim 7. Therefore, for the above reasons and others, Kocal does not render Applicants' claimed zeolite obvious to one of ordinary skill in the art. It is therefore respectfully requested that the rejection under 35 U.S.C. 103 be reconsidered and withdrawn.

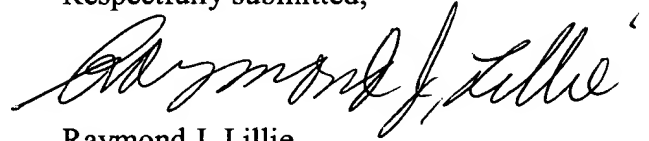
Claims 2 and 3 stand rejected under 35 U.S.C. 103 as being unpatentable over Kocal in view of Yao, et. al. This rejection is respectfully traversed.

Kocal, does not even remotely suggest to one of ordinary skill in the art zeolite Beta, TEA-mordenite, or TEA-ZSM-12 catalyst, as claimed, having an AAI of at least 1.2. Yao discloses a catalyst composition for converting a hydrocarbon stream to olefins and C₆ to C₈ aromatic hydrocarbons. The catalyst includes a zeolite such as ZSM-5 and similar zeolites.

Yao is relied upon by the Examiner because the catalyst, which preferably is ZSM-5, may have a pore volume from about 0.4 ml/g to about 0.8 ml/g, and an average pore diameter of from about 70 Angstroms to about 300 Angstroms. Yao, like Kocal, however, does not disclose or even remotely suggest to one of ordinary skill in the art zeolite Beta, TEA-mordenite, or TEA-ZSM-12, as claimed, having an AAI of at least 1.2, and which has been prepared by a process including the removal of a tetraethylammonium templating agent wherein the templating agent is removed at a temperature of no greater than 550°C. Therefore, the combination of Kocal and Yao does not render Applicants' zeolite Beta, TEA-mordenite, or TEA-ZSM-12, as claimed, having an AAI of at least 1.2, obvious to one of ordinary skill in the art, and it is therefore respectfully requested that the rejection under 35 U.S.C. 103 be reconsidered and withdrawn.

For the above reasons and others, this application is in condition for allowance, and it is therefore respectfully requested that the rejections be reconsidered and withdrawn and a favorable action is hereby solicited.

Respectfully submitted,

A handwritten signature in black ink, appearing to read "Raymond J. Lillie". The signature is fluid and cursive, with the first name "Raymond" being more prominent and the last name "Lillie" following in a similar style.

Raymond J. Lillie
Registration No. 31,778

#217919 v1